a semantic point of view it might be better to regard apoptosis as one kind of programmed cell death, perhaps peculiar to vertebrate animals, and to employ the less specialised term 'programmed cell death' in a more general sense to encompass genetically and physiologically engendered death. On the other hand, 'apoptosis' would prove quite acceptable as the general term if it were to jettison some of the specific properties classically ascribed to it by pathologists which are not always observed in many cases of developmentally mediated cell death.

Ivor D. Bowen

Communication Within Animal Cells; G.J. Barritt; Oxford University Press; Oxford, New York, 1992; xiv + 343 pages. £25.00.

This text provides a broadly based review of the mechanisms involved in inter- and intra-cellular signal transduction from both the biochemical and cell biology viewpoints. It is a timely volume since recent progress in the requisite techniques has enabled significant advances in our knowledge of receptors and their interactions with extracellular signals and of the intracellular pathways through which the resultant response is expressed. In the last decade for example, knowledge of receptor structure, calcium mobilizing hormones and ligand-gated ion channels has extended to a level comparable to that of non-maintenance hormone/neurotransmitter-cyclic nucleotide mechanisms, and provides a focus for much current pharmacological resarch.

The book opens with an outline description of the major types of extracellular signals which regulate the activity of animal cells, the methods of recognition of these signals, and the major pathways by which information is transferred within cells. This is portrayed in an interesting and readily comprehensible style, nicely integrating cellular, organellar and molecular considerations, with a brief review of the history of developments in the field setting the context well. This is followed by a more detailed account of the role of cell structure in intracellular communcation, emphasising the importance of the physical structure of the pathways along which the signalling molecules must pass, then an exposition of the molecular mechanisms involving plasma membrane receptors and G-proteins.

The concept of phosphorylation of proteins as a fundamental method of metabolic regulation is described at length and, in addition to an orthodox review of protein kinases this text, unlike many of its competitors, also contains a good appreciation of the contribution of phosphatases. Consideration of protein kinases leads naturally into cyclic nucleotide biochemistry, and from one set of intracellular messengers the natural progression to the inositol polyphosphates and diacylglycerols and then calcium is followed. A brief consideration of the role of intermediary metabolites in signal transfer by non-covalent modification of proteins follows, prior to more detailed descritpion of eicosanoid function, morphogen, growth factor, mitogen and steroid and thyroid hormone effects upon transcription, application of oncogene information to identification of regulatory proteins and finally the interactions between the various signal transduction pathways.

The high quality of this text owes much to the excellent standard of its illustrations, and overall it successfully covers a wide and rapidly developing topic at the requisite level for its target audience of advanced undergraduate and graduate students. Other specialist text in this area, for example 'Metabolic Regulation' by B.R. Martin (Blackwell Scientific) and 'Biochemical Messengers' by D.G. Hardie (Chapman & Hall) may be better suited for the molecular emphasis of pure biochemistry courses; for more integrated courses with a higher cell biology content, this volume will provide an attractive alternative.

R.P. Newton

Perspectives on Cellular Regulation: From Bacteria to Cancer; Edited by Judith Campisi, Dennis Cunningham, Masayori Inouye and Monica Riley; Wiley-Liss; New York, 1991. xvii + 355 pages. $59.50. ISBN 0-471-56090-1.

This *Festschrift*, published under the imprint of the Marine Biological Laboratory Lectures in Biology, forms a permanent record of a symposium convened, and contributed to, by distinguished former students of Arthur Pardee, to celebrate his scientific achievements on his seventieth birthday.

The subject matter of each article reflects the current research interests of one of his former colleagues. Fortunately, because there was a logical progression in Pardee's scientific interests which has powerfully influenced his students' subsequent research direction, we are not left with a rag-bag of articles, but with a wide ranging and coherent collection not otherwise found in a readable volume. The 28 essays are all agreeably short (8–18 pages) mostly adopting a common format. They start with an anecdote about their time at Berkeley, Princeton or Harvard (where they learnt the "State of the Art") and include engaging insights into the history of science. The paper is completed by a short sketch of the origins and status of their current work.

There are nine essays on prokaryotes, six on the chromosome and cell cycle (mostly of *E. coli*) and three on gene expression. This is followed by a larger section devoted to higher eukaryotes with four essays on signal transduction, five on growth and movement, four on tumour cell biology, four on the cell cycle and two closing articles on molecular evolution and growth control. There is a useful index at the end. The judicious editing cannot disguise the lack of anything on free-living lower eukaryotes which would have made a useful bridge between the other sections.

This volume does not have the combined wit and wisdom of a classic collection like 'Reflections on Biochemistry' in honour of